IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant:	Albert CHAN
Serial No.:	**10/663,207**
Filed:	September 15, 2003
For:	*Thermal Interface Adhesive*
Group Art Unit:	1733
Examiner:	John GOFF II
Confirmation No.:	2364

APPLICANT'S APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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I. REAL PARTY IN INTEREST

The present application is owned by Fujitsu Limited, a Japanese Corporation.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 1 – 31 and 33 stand rejected.

Claim 32 has been cancelled.

Appeal is taken as to all of the rejected claims.

IV. STATUS OF AMENDMENTS

An amendment was filed on October 25, 2006 in response to the Final Office Action dated June 28, 2006. In the subsequent Advisory Action dated November 17, 2006, the Examiner indicated that the amendment would be entered for purposes of appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER[1]

Generally, the present invention is related to thermally conductive adhesives, and in particular to adhesives for joining electronic components to substrates for rapid heat dissipation.

Independent Claim 1 is directed to a method of dissipating heat generated by an electronic component, where the electronic component is attached to a heat receiving surface using a thermal adhesive (Specification as filed, paragraphs [0007], [0010] and [0016]). The thermal adhesive comprises a mixture of a curable polymer composition, a solder powder and a fluxing agent (paras. [0011], [0019] and [0025]). Attaching the electronic component to the heat receiving surface involves heating the thermal adhesive mixture to a temperature above the melting point of the solder powder such that the solder reflows to form interconnecting metal structures dispersed in the polymer matrix prior to the time the polymer becomes cured (paras. [0011], [0013], [0020], [0026] and [0027]), and thereafter curing the polymer matrix such that the adhesive paste hardens (paras. [0013], [0026] and [0027]).

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[1] The summary characterizations of the claimed inventions set forth below are not intended as rigorous interpretations of any of the claims, and the failure to mention certain claimed features in this introductory discussion is not intended to suggest that such features are unimportant for purposes of patentability.

Dependent Claims 2 – 22 specify additional features of the method, such as including additional steps in the method, further limiting other steps in the method, and more particularly identifying the components of the mixture, the electronic component and the heat receiving surface.

Independent Claim 23 is directed to a method of attaching a heat producing electronic component to a heat receiving substrate by forming an adhesive paste comprising a mixture of solder particles, a fluxing agent and a liquid polymer (paras. [0007], [0010], [0019] and [0025]), placing the adhesive paste between a mounting surface of the electronic component and an opposing surface of the heat receiving substrate (paras. [0016] and [0018]), heating the assembly to a temperature sufficiently high to cause the solder particles to melt and reflow prior to the time the polymer becomes cured (paras. [0011], [0013], [0020], [0026] and [0027]), and thereafter curing the polymer such that the adhesive paste hardens (paras. [0013], [0026] and [0027]).

Claims 24 – 31 and 33 specify additional features of the method, such as further limiting steps in the method and more particularly identifying the components of the mixture, the electronic component and the heat receiving surface.

There are no "means-plus-function" or "step-plus-function" claim elements under 35 U.S.C. § 112, sixth paragraph, in any of the claims.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The rejection to be reviewed is from the Final Office Action dated June 28, 2006, from which the present appeal is taken. Because the present application has been rejected at least twice, appeal from the June 28, 2006, Final Office Action is appropriate under 35 U.S.C. § 134 and 37 C.F.R. § 41.31.

Rejections under 35 U.S.C. § 102(b)

Claims 1, 3, 4, 6, 7, 9 – 13, 16, 17, 19 – 23, 28, 29 and 31 were rejected as anticipated by **Nguyen** (U.S. Patent Application Publication No. 2001/0038093).

Rejections under 35 U.S.C. § 103(a)

Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29, 31 and 33 were rejected as obvious over **Jayaraman et al.** (U.S. Patent No. 6,926,955) in view of any one of **Kirsten** (WO 97/07542),

the background of **McCormack et al.** (U.S. Patent Application Publication No. 2001/0030062) or **Pennisi et al.** (U.S. Patent No. 5,128,746).

Claims 1, 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 were rejected as obvious over **Nguyen** in view of **Jayaraman et al.**

Claim 33 was rejected as obvious over **Nguyen**.

Claims 2 and 5 were rejected as obvious over **Nguyen** optionally in view of **JP2001284401**.

Claims 2 and 5 were rejected as obvious over **Jayaraman et al.** in view of any one of **Kirsten**, the background of **McCormack et al.** or **Pennisi et al.** as applied to Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 above, and further in view of **JP2001284401**.

Claim 8 was rejected as obvious over **Nguyen** in view of **Koning et al.** (U.S. Patent Application Publication No. 2003/0150604).

Claims 7 and 8 were rejected as obvious over **Jayaraman et al.** and any one of **Kirsten**, the background of **McCormack et al.** or **Pennisi et al.** as applied to Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 above, and further in view of **Koning et al.**

Claim 8 was rejected as obvious over **Nguyen** and **Jayaraman et al.** as applied to Claims 1, 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 above, and further in view of **Koning et al.**

Claim 15 was rejected as obvious over **Nguyen** in view of **Dietz** (U.S. Patent No. 6,265,471).

Claim 15 was rejected as obvious over **Jayaraman et al.** and any one of **Kirsten**, the background of **McCormack et al.** or **Pennisi et al.** as applied to Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 above, and further in view of **Dietz**.

Claim 15 was rejected as obvious over **Nguyen** and **Jayaraman et al.** as applied to Claims 1, 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 above, and further in view of **Dietz**.

Claims 18 and 24 – 26 were rejected as obvious over **Nguyen** in view of **Bish et al.** (U.S. Patent No. 6,906,413).

Claims 18 and 24 – 26 were rejected as obvious over **Jayaraman et al.** and any one of **Kirsten**, the background of **McCormack et al.** or **Pennisi et al.** as applied to Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 above, and further in view of **Bish et al.**

Claims 18 and 24 – 26 were rejected as obvious over **Nguyen** and **Jayaraman et al.** as applied to Claims 1, 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 above, and further in view of **Bish et al.**

Claim 27 was rejected as obvious over **Nguyen** and **Bish et al.** as applied to Claims 18 and 24 – 26 above, and further in view of **Koning et al.**

Claim 27 was rejected as obvious over **Jayaraman et al.** and any one of **Kirsten**, the background of **McCormack et al.** or **Pennisi et al.**, and **Bish et al.** as applied to Claims 18 and 24 – 26 above, and further in view of **Koning et al.**

Claim 27 was rejected as obvious over **Nguyen** and **Jayaraman et al.** as applied to Claims 18 and 24 – 26 above, and further in view of **Koning et al.** It is noted that this rejection should have additionally listed the **Bish et al.** reference, based on the structure of the rejection of Claims 18 and 24 – 26 referenced.

Claim 30 was rejected as obvious over **Nguyen** and **Bish et al.** as applied to Claims 18 and 24 – 26 above, and optionally further in view of **JP2001284401**.

Claim 30 was rejected as obvious over **Jayaraman et al.** and any one of **Kirsten**, the background of **McCormack et al.** or **Pennisi et al.**, and **Bish et al.** as applied to Claims 18 and 24 – 26 above, and optionally further in view of **JP2001284401**.

Claim 30 was rejected as obvious over **Nguyen** and **Jayaraman et al.** as applied to Claims 18 and 24 – 26 above, and optionally further in view of **JP2001284401**. It is noted that this rejection should have additionally listed the **Bish et al.** reference, based on the structure of the rejection of Claims 18 and 24 – 26 referenced.

VII. ARGUMENT

A. Introduction

All of the pending claims of this application were rejected either as anticipated by Nguyen (U.S. Patent Application Publication No. 2001/0038093) or as obvious over various

combinations of Nguyen, Jayaraman et al. (U.S. Patent No. 6,926,955), Kirsten (WO 97/07542), the background of McCormack et al. (U.S. Patent Application Publication No. 2001/0030062), Pennisi et al. (U.S. Patent No. 5,128,746), JP2001284401, Koning et al. (U.S. Patent Application Publication No. 2003/0150604), Dietz (U.S. Patent No. 6,265,471), and Bish et al. (U.S. Patent No. 6,906,413). To establish a prima facie case of obviousness, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). M.P.E.P. § 2143.03. Additionally, an examiner must show more than the presence of the elements of a claim in a collection of prior art references. The examiner must also show some suggestion or motivation for making the combination. *In re Bond,* 15 USPQ2d 1566 (Fed. Cir. 1990); *Carella v. Starlight Archery and Pro Line Co.*, 804 F.2d 135, 140, 231 USPQ 644, 647 (Fed. Cir. 1886); *see also ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

B. Rejection of Claims 1, 3, 4, 6, 7, 9 – 13, 16, 17, 19 – 23, 28, 29 and 31 as anticipated by Nguyen

Claims 1, 3, 4, 6, 7, 9 – 13, 16, 17, 19 – 23, 28, 29 and 31 were rejected under 35 U.S.C. § 102(b) as anticipated by Nguyen (U.S. Patent Application Publication No. 2001/0038093). Applicant respectfully traverses this rejection.

1. Claims 1 and 23

a. *Nguyen does not teach a polymer that hardens.*

Claims 1 and 23 require, *inter alia*, that the polymer matrix cures "such that the adhesive paste hardens." This is not taught by the Nguyen reference.

While it is well-settled that an examiner may not import limitations from the specification into the claims, it is also a principle of patent examination that an examiner may look to the specification for understanding of claim terms and that a patent applicant may be his own lexicographer (*see* MPEP §§ 2111.01 and 2173.01). Here, the Applicant has chosen to use the term "cure" in certain instances and "harden" in others, within the same claims. Thus it is appropriate that the Examiner look to the specification to determine the meaning of the two terms relative to one another. From paragraphs [0020], [0022] and [0027], it can be seen that the Applicant intends "harden" to indicate a particular type of curing, rather than to be a synonym for "cure." Further, from the language of the claims themselves, it is clear that there must be a

distinction between the two terms. If, as the Examiner asserts, the two terms *were* interchangeable, the relevant portions of the independent claims would read "curing ... such that the adhesive paste cures" or "hardening ... such that the adhesive paste hardens." In both variations, there would have been no purpose in including the "such that..." clauses because neither would have provided further limitations to the claims. In the actual claim language, however, the "such that..." clause further limits the term "curing," indicating that the polymer cures in a particular manner. Accordingly, the Examiner's position that the two words have the same meaning is not supported.

The Examiner has also contended that the term "harden" means nothing more than to become more firm; however, the Examiner continues to ignore the distinction between the terms "cure" and "harden." As discussed above, and as can be understood from the specification, a polymer that has *cured* is one in which the polymerization process, or cross-linking, is complete. Thus, a cured polymer has become set but not necessarily hard, whereas a polymer that has *hardened* is one that has in fact become hard. In other words, polymers that harden are a subset of those that cure. Accordingly, Nguyen does not teach hardening of the polymer as the term is used in the present application because the reference states that the cured polymer forms "a compliant elastomer," (para. [0018]) where compliant is defined as "yielding and formable at room temperature, as opposed to solid and unyielding" (para. [0020]). Thus, the polymer described in Nguyen cures to a form that is soft and compliant (see also paras. [0014] – [0019]). As such, Nguyen does not teach a polymer that *hardens* when it cures.

b. *Applicant's argument is commensurate with the scope of the claims.*

With respect to the arguments regarding the "compliant" cured polymer of Nguyen and the "elasticity" of the polymer of the present invention (*see* Final Office Action, dated June 28, 2006, page 3 and Amendment "B," dated October 25, 2006, page 7), the Examiner has indicated that the claims are not commensurate in scope with Applicant's argument (Advisory Action, dated November 17, 2006, page 2). In the Final Office Action, the Examiner contends that the compliant polymer of Nguyen was a hardened polymer, citing Applicant's specification (para. [0022]) as teaching a hardened polymer having elasticity, and concluded that a compliant polymer and a hardened polymer having elasticity were the same. In response to this rejection, Applicant argued that the compliant polymer of Nguyen and a hardened polymer having

elasticity were not the same, based upon Applicant's definition of "harden" (as discussed in detail above), and supported by portions of paragraph [0022] that the Examiner did not address. Specifically, Applicant pointed out that the term "hardened" meant a form that could absorb mechanical stresses, rather than being deformed by them (Amendment "B," page 7). As such, Applicant did not attempt to broaden or alter the scope of the claims with this argument, but merely asserted that the significant difference between the reference and the claims of the present application can be seen when the terms in the claims are given their intended meanings.

As Nguyen does not teach the element of a polymer matrix that cures such that the adhesive paste hardens, it cannot anticipate Claims 1 and 23, and thus Claims 1 and 23 were not properly rejected.

2. Claims 3, 4, 6, 7, 9 – 13, 16, 17 and 19 – 22

Claims 3, 4, 6, 7, 9 – 13, 16, 17 and 19 – 22 depend from Claim 1 and Claims 28, 29 and 31 depend from Claim 23 and were not properly rejected for at least the same reasons.

C. Rejection of Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29, 31 and 33 as obvious over Jayaraman et al. in view of any one of Kirsten, the background of McCormack et al. or Pennisi et al.

Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29, 31 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Jayaraman et al. (U.S. Patent No. 6,926,955) in view of any of the following references: Kirsten (WO 97/07542), McCormack et al. (U.S. Patent Application Publication No. 2001/0030062), or Pennisi et al. (U.S. Patent No. 5,128,746).

1. Claims 1 and 23

a. *Jayaraman et al. also does not teach a polymer that hardens.*

Claims 1 and 23 require, *inter alia*, that the polymer matrix cures "such that the adhesive paste hardens." This is not taught by the Jayaraman reference. The Examiner asserted that Jayaraman et al. teaches a liquid curable polymer that is heated to cure the polymer (Final Office Action, pages 4 – 5), however, in the same manner as discussed above with respect to Nguyen, the claim terms "harden" and "cure" have been misinterpreted by the Examiner. The Examiner stated that Applicant's argument (Amendment "B," pages 7 – 8) regarding this rejection is not commensurate with the scope of the claims. However, again the Examiner has failed to consider the claims using the definitions intended by the Applicant. In Amendment "B," Applicant

directed the Examiner's attention to portions of the specification to provide a more complete understanding of the claim terms. The Examiner contends that the phase change polymer of Jayaraman et al. is the same as the hardened polymer of the present invention (Final Office Action, pages 4 – 5 and Advisory Action, page 2); however, the Applicant respectfully disagrees.

A phase change polymer, as disclosed in Jayaraman et al., becomes fluid when heated to the operating temperature of an electronic device in which it is used. This ability to change state to a fluid occurs *after* the polymer has already cured. This is a specific difference from the polymer of the present invention, which cures to a hardened form and does not change state in response to further heating (Specification, para. [0022]). Contrary to the Examiner's statement (Advisory Action, page 2), the claims are commensurate in scope with this argument because paragraph [0022] merely provides the *meaning* of the term "harden" as used by Applicant where it describes the polymer as absorbing stresses caused by thermal cycling. Applicant's argument relates to the definition of the claim terms; there is no attempt at broadening or altering the scope of the claims. The Examiner's assertion that the Jayaraman et al. phase change polymer and the hardened polymer of the present invention are the same is also directly contradicted by Jayaraman et al.'s disclosure that the types of phase change polymers used are a *soft* solid at room temperature (col. 2, lines 12-15).

Further, although Jayaraman et al. and the present application both disclose a polymer matrix that can include silicone or epoxy polymer resins, this is not a teaching that the polymers have the same features or properties. The properties of the polymers of Jayaraman et al. and the present invention are fundamentally different, even though they may contain some of the same substances. As discussed above, Jayaraman et al. teaches polymers that change phase when heated, whereas the present application specifies that the polymers are hardened such that they should be able to withstand thermal stresses. Thus, based on at least this difference, the Jayaraman et al. reference does not teach polymers that harden when cured. Further, the basic principles of Jayaraman et al. require phase change polymers because it is necessary to the workings of the invention that the polymer flows into cavities when heated. Therefore, it would not be obvious, nor would there be any motivation, to substitute a polymer that hardens.

b. *The motivation to combine Jayaraman et al. with any of Kirsten, McCormack et al. or Pennisi et al. is improper.*

In the Advisory Action, the Examiner stated that Applicant's argument is not persuasive. Applicant had argued that there is no motivation to combine these references because the addition of fluxing agents to a phase change polymer would destroy the function of the invention. The Examiner contends that Jayaraman et al.'s list of non-fusible fillers included other materials in addition to metal oxides and the relative size of the non-fusible filler particles is larger than that of the fusible filler particles, and concluded that the use of a fluxing agent would have "a negligible impact." However, the Examiner failed to provide any support for this conclusion. Further, none of the motivation cited by the Examiner (noting that the Examiner cited each of Kirsten, McCormack et al. and Pennisi et al. generally) suggests that this combination can be made with a phase change polymer, which, as discussed above, has significant differences in properties from other polymers. As such, there is no showing that one of ordinary skill in the art would be motivated to combine or find it obvious to combine these references.

Therefore, because Jayaraman et al. does not teach a polymer that hardens and because it would not have been obvious to add a fluxing agent to Jayaraman et al., Claims 1 and 23 cannot be held obvious over these references and the rejection of these claims was improper.

2. Claims 3, 4, 6, 9 – 14, 16, 17 and 19 – 22

Claims 3, 4, 6, 9 – 14, 16, 17 and 19 – 22 depend from Claim 1 and Claims 28, 29, 31 and 33 depend from Claim 23, and were not properly rejected for at least the same reasons.

D. Rejection of Claims 1, 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 as obvious over Nguyen in view of Jayaraman et al.

Claims 1, 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Nguyen in view of Jayaraman et al.

1. Claims 1 and 23

a. *The motivation to combine Nguyen and Jayaraman et al. is improper.*

The Examiner has asserted that the combination of Jayaraman et al. with the Nguyen reference is merely to show that in a similar process, heated solder powder reflows to form interconnecting metal structures while the curable polymer is cured. The Examiner has not, however, provided any motivation for the combination of these references. The polymers in

Jayaraman et al. and Nguyen are substantially different based on the phase change property of the Jayaraman et al. polymer. There has been no showing that the polymers are compatible with each other, and, absent some motivation, these references cannot properly be combined.

Therefore, because the combination of the references was improper, they were not properly rejected under 35 U.S.C. § 103(a).

2. Claims 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 22, 28, 29 and 31

Claims 3, 4, 6, 7, 9 – 14, 16, 17 and 19 – 22 depend from Claim 1 and Claims 28, 29 and 31 depend from Claim 23 and were not properly rejected for at least the same reasons.

E. Rejection of Claim 33 as obvious over Nguyen

Claim 33 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Nguyen.

As discussed above, Nguyen does not teach a polymer that hardens when it cures. It would also not have been obvious to one of ordinary skill in the art to use a polymer that hardens in Nguyen because Nguyen specifically teaches away from a "solid and unyielding" material (para. [0018]). Accordingly, Nguyen cannot make obvious the features of Claim 33, thus the claim was not properly rejected.

F. Additional 35 U.S.C. § 103(a) Rejections

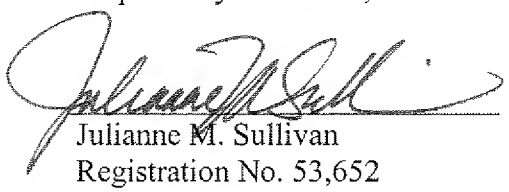
Claims 2, 5, 7, 8, 15, 18, 24 – 27 and 30 were rejected under 35 U.S.C. § 103(a) over various combinations of the above references in view of several additional references. Based upon the foregoing comments it believed that independent Claims 1 and 23 were not properly rejected; accordingly, the rejection of each of the dependent claims was also improper.

VII. CONCLUSION

For the foregoing reasons, Applicant respectfully requests that the rejection of all of the pending claims of the application be reversed.

March 20, 2007

Respectfully submitted,



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APPENDIX OF THE CLAIMS INVOLVED IN THE APPEAL

Claim 1. A method of dissipating heat generated by an electronic component, comprising the step of attaching the electronic component to a heat receiving surface using a thermal adhesive, wherein the thermal adhesive comprises:

a mixture of a curable polymer composition, a solder powder, and a fluxing agent, and

wherein the step of attaching comprises heating said mixture to a temperature above the melting point of said solder powder, such that the solder reflows to form interconnecting metal structures dispersed in the polymer matrix prior to the time the polymer becomes cured, and thereafter curing the polymer matrix such that the adhesive paste hardens.

Claim 2. The method of claim 1 wherein said mixture contains 40% to 60% solder powder by volume.

Claim 3. The method of claim 1 wherein said mixture further comprises metallic particles having a high melting point.

Claim 4. The method of claim 3 wherein said metallic particles have a thermal conductivity of about 400 W/m-K or more.

Claim 5. The method of claim 3 wherein the combined volume percentage of metallic particles and solder in said adhesive mixture after it has been cured is about 40 to 60%.

Claim 6. The method of claim 3 wherein said metallic particles are copper, silver or a combination thereof.

Claim 7. The method of claim 3 wherein said metallic particles have a mean particle size in the range of about 0.01 mm to 0.1 mm.

Claim 8. The method of claim 3 wherein at least some of said metallic particles are coated with solder prior to being incorporated into said mixture.

Claim 9. The method of claim 1 wherein said uncured polymer is a liquid at room temperature.

Claim 10. The method of claim 1 wherein said mixture is formed at less than 80° C.

Claim 11. The method of claim 1 wherein said polymer matrix is cured by further heating after the solder has melted and reflowed.

Claim 12. The method of claim 1 wherein said electronic component is an IC chip.

Claim 13. The method of claim 1 wherein said heat receiving surface is a surface of a heat spreader or heat sink.

Claim 14. The method of claim 1 wherein said heat receiving surface is actively cooled.

Claim 15. The method of claim 1 wherein said thermal adhesive has a thermal conductivity of about 15 W/mK or more.

Claim 16. The method of claim 1 wherein said mixture is dispensed or screen printed onto either said electronic component or onto said heat receiving surface.

Claim 17. The method of claim 1 wherein the coefficient of thermal expansion of said electronic component is different than the coefficient of thermal expansion of said heat receiving surface.

Claim 18. The method of claim 1 wherein said thermal adhesive has a thickness less than about 0.2 mm.

Claim 19. The method of claim 1 wherein said solder has a melting point of about 235° C or less.

Claim 20. The method of claim 19 wherein said solder has a thermal conductivity of about 20 W/m-K or more.

Claim 21. The method of claim 20 is selected from the group consisting of alloys of Sn/Bi, Sn/Pb, Sn/Zn, Sn/Ag, Sn/Cu, Sn/Ag/Cu, and Sn/Ag/Cu/Bi.

Claim 22. The method of claim 1 wherein said polymer matrix comprises an epoxy, a silicone or a cyanate ester.

Claim 23. A method of attaching a heat producing electronic component to a heat receiving substrate, comprising:

forming an adhesive paste comprising a mixture of solder particles, a fluxing agent and a liquid polymer,

placing said adhesive paste between a mounting surface of said electronic component and an opposing surface of said heat-receiving substrate,

thereafter, heating the assembly to a temperature sufficiently high to cause said solder particles to melt and reflow prior to the time the polymer becomes cured,

thereafter curing said polymer such that the adhesive paste hardens.

Claim 24. The method of claim 23 wherein said mounting surface and said opposing surface are substantially flat and are separated by a distance of about 0.2 mm or less.

Claim 25. The method of claim 24 wherein said adhesive paste further comprises particles of a metallic filler material having a high melting point.

Claim 26. The method of claim 25 wherein said metallic filler material comprises silver or copper.

Claim 27. The method of claim 25 wherein at least some of said metallic particles are precoated with solder prior to being added to said mixture.

Claim 28. The method of claim 23 wherein said polymer is thermosetting and has an optimal curing temperature which is different than the melting point of said solder.

Claim 29. The method of claim 23 wherein said polymer is relatively low viscosity.

Claim 30. The method of claim 25 wherein said mixture comprises more than about 40 to 60% by volume of filler and solder.

Claim 31. The method of claim 23 wherein said electronic component and said heat receiving substrate have substantially different coefficients of thermal expansion.

Claim 32. (canceled).

Claim 33. The method of claim 28 wherein the polymer is cured at a temperature that is lower than the melting point of the solder.

APPENDIX OF EVIDENCE

None.

APPENDIX OF RELATED PROCEEDINGS

None.